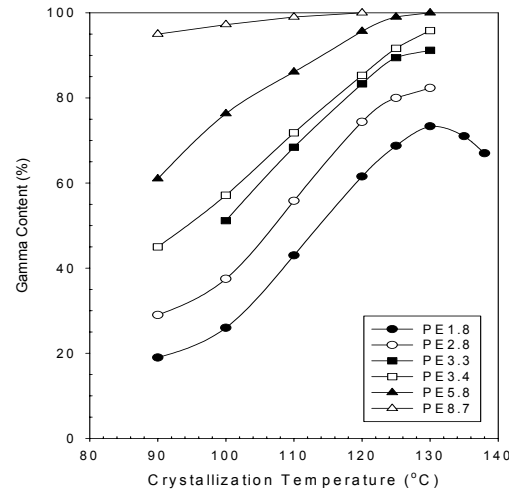


Effect of Defect Microstructure on Properties of Crystalline Polymers

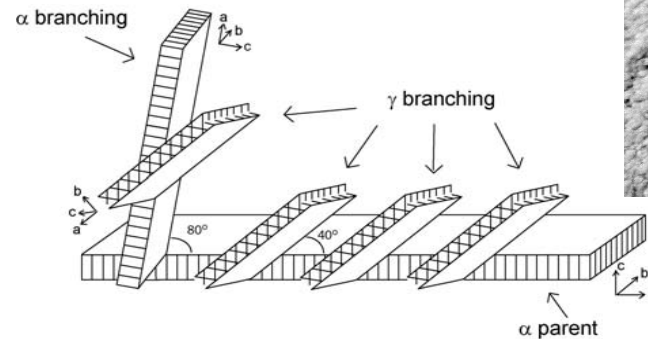
Rufina G. Alamo, FAMU-FSU College of Eng., DMR-0094485

The properties of semicrystalline polymers depend on the details of the crystalline structure acquired during crystallization. All the crystalline structural variables are affected by the addition of defects to the polymer molecule. This research aims to understand the independent effects of concentration, inter and intra-molecular distribution and types of defects on the lamellar structure and crystallization kinetics of these materials. The figures show how the random addition of increasing contents of ethylene to an isotactic polypropylene chain induces polymorphic behavior, shifting from a classical unit cell (α) to one with non-parallel molecules (γ) with obvious implications in the deformation properties of these materials. Specific structural relations between the alpha and gamma polymorphs were confirmed by the change in intraspherulite lamellar branching and lamellar orientation with increasing ethylene content as observed in the AFM micrographs.

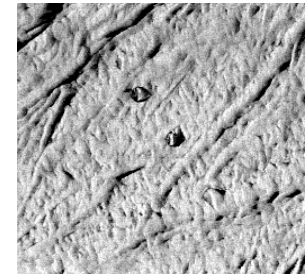
Macromolecules, **36**, 5623, 2003



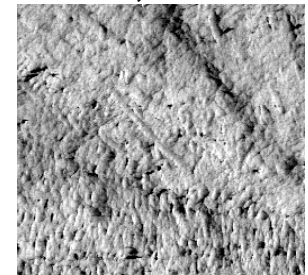
Percentage of γ phase vs. T_c for metallocene propylene ethylene copolymers with ethylene content increasing from 0.8 mol% to 7.5 mol%.



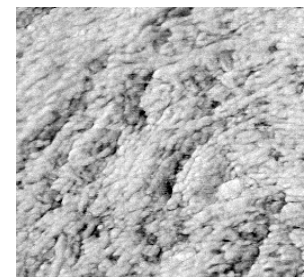
Schematic model of α iPP and γ iPP branching from α 'parent' lamellae.



PE 1.8, $T_c = 110$ C



PE 3.4, $T_c = 110$ C



PE 8.7, $T_c = 110$ C

Polymer, **45**, 3441, 2004

Effect of Defect Microstructure on Properties of Crystalline Polymers Polymers

Rufina G. Alamo, FAMU-FSU College of Eng., DMR-0094485

Education:

Under this grant, one student has completed her PhD: Dr. A. Simanke (Braskem), two students have completed their masters, Ms. Isabel Carrileno-Borbujo (Rohm and Hass) and Mr. Jose A. Blanco-Saralegi (Pharmaceutics); two post-doctoral scientists have been trained: Dr. I Hosier (University of Southampton), Dr. D. Mowery (Sandia National Laboratory); seven REU undergraduate students have been supported: E. Ritchson (graduate student at Purdue), P. Estes (graduate student at John Hopkins University), S. Doyle, J. Lewis, D. Laboy (Honors senior, FSU), Y. Chiari (Honors senior, FSU) and K. Thompson (Junior, FSU). A visiting scientist: Prof. J. Park (Hankyong University) also participated in the research.

Currently, two PhD graduate students: A. Ghosan (2nd year), and J. Vargas (1st year), one MS student, S. Kotha (1st year) and a visiting scientist: I. Garcia-Zubiri (University of Navarra, Spain) are involved in the research.

Outreach:

Freshman FSU Honors Chemistry students have been integrated in our research activities for one semester as part of their laboratory requirements. Four general lectures in polymers were given last Fall semester to freshman and junior FSU female students who participated in WINSE (Women in Science and Engineering), a university program which focuses on the retention of women in science and engineering.

The picture below shows PI and current graduate and undergraduate students.

